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## ADVANCES IN PLASTICS DURING 1944

In a review of developments in plastics during 1944, prepared by Gordon M. Kline for publication in "Modern Plastics" and in "Mechanical Engineering," it is pointed out that the resources and energies of the industry during the past 12 months were fully occupied on wartime assignments. Recently published statistics indicate that the industry has had a tenfold growth during the past decade. The total production of synthetic resins during 1943 was a record figure of 650,000,000 pounds and will probably approach very close to 700,000,000 pounds for 1944.

The year just closed was notable for the steady growth of already familiar products rather than for the introduction of radically new types of compounds. Polyethylene, which has been in commercial production in this country since 1943, is used practically exclusively for the insulation of high-frequency wire and cable. The new high-temperature silicone resin insulation has made it possible to reduce the size and weight of electric motors, to increase greatly the service life of in-

sulation in conventional equipment, and to operate in ambient temperatures and humidities much higher than those permissible for previous types of organic insulation. These resins have provided the basis for the greatest advance in electrical insulation since the advent of glass fiber.

Plastics engineers are well aware that the 400,000,000-pound plant capacity for the manufacture of styrene, built to meet the requirements of the synthetic rubber program, represents a tremendous potential source of raw material for the production of polystyrene and styrene copolymer resins after the war. The forerunners of numerous developments in this field were announced in 1944.

A high solids water dispersion of vinyl chloride resin, known as Geon latex, has been found suitable for impregnating paper and fabric and for the manufacture of hospital sheeting and foul weather clothing. The latex method eliminates costly solvents and recovery systems, and promotes better adhesion of the resin to fibrous bases.

Resorcinol-formaldehyde resins, which cure rapidly at temperatures from 60° to 150° F. under nearly neutral

<sup>1</sup> Published with approval of the Director of the Budget.

conditions, have been found to be especially advantageous for assembly bonding of wood and other materials which are deteriorated by the strong acids used in cold-setting urea and phenolic glues.

The terms "sandwich materials" and "expanded (or foamed) plastics" have frequently appeared in the plastics literature of 1944 and are destined to become common parlance during the next few years. The advantages of sandwich construction involving stiff, dense faces separated and stabilized by a thick, light core have long been known. In the aircraft industry considerable interest has been stimulated in sandwich materials by the ever-increasing difficulty of maintaining rigid contours in high-speed aircraft. This type of construction was employed for an experimental resin-glass fuselage built by the Army Air Forces.

The sweeping advances in the development of high-frequency preheating equipment and the utilization of this technique in speeding production and solving heavy-section molding problems make this process outstanding in the roster of 1944 accomplishments in the plastics industry. The record of heat-ronc molding of industrial parts is filled with examples of amazing reductions in curing time with concomitant savings in manpower and machine hours. Curing time of a propeller block has been reduced from 12 to 2 minutes; telephone handset, 8 to 3 minutes; air-plane control pulley, 5 minutes to 1 minute; and an ignition part from 6 minutes to 1 minute.

The adaptation of the injection and extrusion molding processes to thermo-setting plastic materials has been another high light of the year. One machine with motor-driven screw has proved in tests to be satisfactory for injection molding and continuous extrusion of thermosetting and thermoplastic materials and natural and synthetic rubbers. Experimental rocket-launching tubes have been made by the continuous extrusion process with this apparatus.

The record of 1944 with respect to utilization of plastics in the war effort has also been primarily one of concentration on items tried and proved in the preceding two years. Bomb tubes, M-52 fuzes, rifle butts, resinous coatings for steel cartridge cases, medicine containers, medical equipment, mess trays, screening, and range-finding equipment, are among the long list of military supplies employing plastics.

The outstanding new application of plastics for military purposes in 1944 was the rocket-launching tube. These tubes, which are 10 feet long and have an inside diameter of 4½ inches, are mounted in clusters of three on the underside of fighter planes. Among the advantages attributed to the laminated plastic "flying bazooka," as compared with steel and magnesium tubes, are lighter weight, resistance to corrosion, and reduction of the hazards involved in the event of malfunctioning of the rocket equipment.

The year was marked by a further healthy growth of the technical literature on the properties and testing of plastics; the number of such articles was almost double that of the 1943 review.

Technically, the highlight of the year was the symposium on plastics held under the auspices of the American Society for Testing Materials in Philadelphia in February. Among the subjects covered were the heat resistance of laminates, effect of environmental conditions on the mechanical properties of plastics, diffusion of water through plastics, stiffness and brittleness of vinyl elastomers, behavior of plastics under repeated stress, testing of high-strength plastics, and creep characteristics of plastics.

The formation of ASTM Committee D-14 on adhesives was announced during the year. Subcommittees on strength properties analytical tests, permanence properties, working qualities, specifications, and nomenclature have been organized. The cooperative efforts of producers, users, and other interested groups in the activities of this committee should lead to uniform testing procedures and valuable data on the properties of all types of adhesives, and promote the development of improved resinous bonding materials.

### RELAXATION OF STRESSES IN ANNEALING GLASS

Because of their high viscosity, glasses and certain so-called plastics are easily undercooled and superheated. As a result, their properties, including viscosity, are usually changing continually while these materials are at temperatures within their annealing ranges, even if the temperature is constant. That is, the changes continue until the materials reach equilibrium conditions at the temperatures at which the annealing takes place. This change in

viscosity which accompanies the approach to equilibrium greatly affects the rate at which stresses relax when strained glass is being annealed at a constant temperature.

As the annealing process for the relaxation of stresses is a very important matter in the production of glass, it has been the subject of many extensive studies, and various attempts have been made to relate the relaxation of the stresses to the time and temperature of annealing. The exponential relation derived from Maxwell's equation for viscous flow, without considering the change in viscosity at a constant annealing temperature, is usually entirely inadequate. Also, the substitute reciprocal relation proposed by Adams and Williamson is generally unsatisfactory.

In RP 1637, which will appear in the Journal of Research for February, Arthur Q. Tool derives another relation. It is based on Maxwell's equation but takes into account the change in viscosity. To compare its applicability with that of the relation proposed by Adams and Williamson, it has been applied to their data on the relaxation of stresses at various temperatures and in several kinds of glass. This comparison greatly favors the new relation. Fortunately, it also leads to a clearer understanding of the behavior and nature of glass.

#### **SPECTRAL RANGE OF BIOLOGICAL EFFECTIVENESS OF SUNBURN-PREVENTIVE CREAMS**

As noted in Technical News Bulletin No. 326 (June 1944), the most efficient sunburn-preventive creams contain substances that are highly opaque to solar radiation of wavelengths 2900 Å to 3200 Å, which are specific in causing sunburn and in producing vitamin D (antirachitic).

Such creams are somewhat transparent to wavelengths 2600 Å and shorter; hence they permit the passage of (antirachitic) vitamin D-producing and erythematogenic rays. However, the question has arisen whether ultraviolet solar radiation of wavelengths 2600 Å and shorter can reach the earth's surface in sufficient intensity to be biologically effective in producing vitamin-D.

Using a quartz spectrograph, the shortest wavelength yet recorded at sea level is 2898 Å; and in the high Alps (3.4 kilometers) and in unmanned balloons at a height of 30 kilometers, the

shortest wavelengths photographed were slightly longer than 2863 Å. Taking into consideration the threshold of blackening of the photographic plate, this indicates an intensity of the order of one-billionth of a watt per square centimeter.

Using the most sensitive "light counters" (Geiger counters) yet devised and photoelectric cells that respond only to wavelengths of 2680 Å and shorter, observers are in disagreement in their observations of incoming radiation (if any) of wavelengths shorter than 2898 Å, recorded photographically.

Granting that ultraviolet solar radiation of wavelengths 2680 Å and shorter has been detected by means of "light counters," and basing his calculations (1) upon observations of Fabry and Buisson (*Astrophys. J.* 54, 297, 1921) and that the earth's atmosphere transmits less than 1 part in 2,000,000 of the incident radiation at 2898 Å and (2) upon laboratory measurements on ozone (and long columns of air between mountain stations) showing that the transmission of the earth's atmosphere for wavelengths at 2600 Å is less than 1/1000 of the value at 2898 Å, W. W. Coblenz concludes that the intensity of solar radiation of wavelengths at 2600 Å is reduced to less than 1 part in 2,000,000,000 in traversing the earth's atmosphere.

Furthermore, taking into consideration spectral energy measurements, by three sets of observers, in the range of 2900 Å to 3100 Å, indicating an intensity at 2600 Å, that is, about 1/100 to 1/150 that at 3024 Å, outside the earth's atmosphere, Dr. Coblenz deduces that after transmission through the earth's atmosphere the intensity at 2600 Å is about 1 part in 3,000,000,000 of that at 3024 Å.

The antirachitic (vitamin D-producing) and the erythematogenic effectiveness of these two wave bands is practically the same. Hence, comparisons are permissible.

In order to insure effective biologic action within a solarium during the winter, the Council on Physical Medicine of the American Medical Association requires for acceptance that the window glass have a transmission of not less than 30 percent at 3024 Å, or roughly 3 microwatts per square centimeter of solar radiation in this wave band. Since sunburn-preventive creams transmit less than 1 percent in the wave band at 2600 Å, and since the estimated intensity of the incident solar radiation is

not greater than a few billionths of the threshold, the conclusion arrived at is that even if ultraviolet solar radiation of wave lengths 2200 Å to 2800 Å reaches the earth's surface it is biologically ineffective.

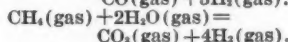
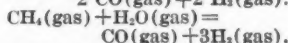
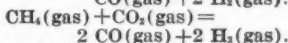
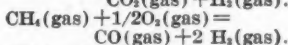
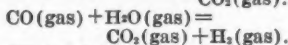
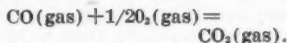
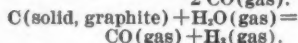
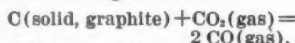
This conclusion seems to be supported by the fact that the human skin has not developed a defensive tanning reaction for wavelengths shorter than about 2800 Å.

### THERMODYNAMICS OF REACTIONS INVOLVED IN PRODUCTION OF HYDROCARBON LIQUID FUELS

A comprehensive report giving selected "best" values of the thermodynamic properties for a number of reactions fundamental to the production of hydrocarbon liquid fuels from natural gas or coal and hydrogen will appear in the February number of the Journal of Research.

This report (RP1634), by Donald D. Wagman, John E. Kilpatrick, William J. Taylor, Kenneth S. Pitzer, and Frederick D. Rossini, was prepared jointly by the thermochemical laboratory and the American Petroleum Institute Research Project 44 at the Bureau, and gives values for the following thermodynamic properties: The heat-content function,  $(H^\circ - H^\circ_0)/T$ , the free-energy function,  $(F^\circ - H^\circ_0)/T$ , the entropy,  $S^\circ$ , the heat content,  $H^\circ - H^\circ_0$ , and the heat capacity,  $C_p^\circ$ , for  $O_2(gas)$  to 5,000°K,  $H_2(gas)$  to 5,000°K,  $H_2O(gas)$  to 3,000°K,  $N_2(gas)$  to 5,000°K,  $C(solid, graphite)$  to 1,500°K,  $C(solid, diamond)$  to 1,200°K,  $CO(gas)$  to 5,000°K,  $CO_2(gas)$  to 3,500°K, and  $CH_4(gas)$  to 1,500°K; the standard entropy,  $S^\circ$ , for  $H_2O(lig)$  at 25°C; the heat of formation,  $\Delta H_f^\circ$ , the free energy of formation,  $\Delta F_f^\circ$ , and the equilibrium constant of formation,  $K_f$ , from the elements, for  $H_2O(lig)$  at 25°C, and for  $H_2O(gas)$ ,  $CO(gas)$ ,  $CO_2(gas)$ , and  $CH_4(gas)$ , to 1,500°K; the increment in heat content,  $\Delta H^\circ$ , and the increment in free energy,  $\Delta F^\circ$ , for the transition of graphite into diamond, to 1,200°K and to 20,000 atmospheres.

From the foregoing, values were calculated for the increment in heat content,  $\Delta H^\circ$ , the increment in free energy  $\Delta F^\circ$ , and the equilibrium constant,  $K$ , for the following reactions:



A table of the fundamental constants used in the calculations is given.

### HEATS OF ISOMERIZATION OF OCTANES

In the February number of the Journal of Research (RP 1635), a report is given by Edward J. Prosen and Frederick D. Rossini of the thermochemical laboratory on the experimental determination of heats of isomerization of all of the 18 octanes by measurement of the ratios of their heats of combustion, in the liquid state for 17, and the solid state for 1, using the procedure previously described for the hexanes and the heptanes.

The following values were obtained for the liquid (or solid) state at 25° C, and were calculated to the gaseous state at 25° C:

Isomer	Heat of isomerization, $\Delta H$ , for $n-C_8H_{18} = i-C_8H_{18}$	
	Liquid <sup>1</sup> 25° C	Gas 25° C
	kcal/mole	kcal/mole
n-Octane.....	0.00	0.00
2-Methylheptane.....	-1.25 ± 0.22	-1.68 ± 0.22
3-Methylheptane.....	-0.61 ± 0.19	-1.00 ± 0.19
4-Methylheptane.....	-.44 ± 0.19	-0.87 ± 0.19
3-Ethylhexane.....	-.14 ± 0.17	-.58 ± 0.17
2,3-Dimethylhexane.....	-2.89 ± 0.16	-3.89 ± 0.16
2,3-Dimethylhexane.....	-0.67 ± 0.28	-1.31 ± 0.28
2,4-Dimethylhexane.....	-1.73 ± 0.18	-2.62 ± 0.18
2,5-Dimethylhexane.....	-2.53 ± 0.28	-3.39 ± 0.28
3,3-Dimethylhexane.....	-1.85 ± 0.17	-2.79 ± 0.17
3,4-Dimethylhexane.....	-0.49 ± 0.29	-1.09 ± 0.29
2-Methyl-3-ethylpentane.....	+ .05 ± 0.22	-0.66 ± 0.22
3-Methyl-3-ethylpentane.....	-.73 ± 0.21	-1.56 ± 0.21
2,2,3-Trimethylpentane.....	-1.70 ± 0.28	-2.79 ± 0.28
2,2,4-Trimethylpentane.....	-2.24 ± 0.25	-3.75 ± 0.25
2,3,3-Trimethylpentane.....	-0.89 ± 0.26	-1.91 ± 0.26
2,3,4-Trimethylpentane.....	-1.25 ± 0.32	-2.15 ± 0.32
2,2,3,3-Tetramethylbutane.....	-4.50 ± 0.38	-4.17 ± 0.38

<sup>1</sup> For all except 2,2,3,3-tetramethylbutane, which is solid.

<sup>2</sup> For the solid.

**SPECTROGRAPHIC ANALYSIS OF  
PORTLAND CEMENT**

Spectrographic analysis (quantitative analysis by means of the spectrograph) depends upon the fact that elements can be made to radiate light, the spectrum of which has many lines characteristic of those elements. The relative intensities of lines for different elements bear a complicated but definite relation to the relative quantities, kinds and number of elements in the source. By controlling the excitation used for the source and dividing analytical problems into type cases, empirical data may be obtained which give a quantitative analysis quickly and accurately. Spectrographic methods are ideally suited to problems in which (1) a rapid determination is required, (2) the size of the sample is necessarily small, (3) the concentrations of the elements in question are small, and (4) the chemical method is difficult or uncertain. This subject has been most advanced in the fields of metals and alloys where speed is essential. Its successes there have encouraged its spread to many other analytical problems.

The spectrographic method applied to the determination of the minor elements in portland cement would be expected to result in a great saving in labor and time. This has been found to be particularly true for the alkali elements where the usual chemical methods are difficult, time-consuming and subject to irregularities. Because of the empirical character of the spectrographic method and its dependence upon the nature and state of all the elements present a special study was required to develop a detailed and reliable procedure for portland cement. In the February Journal of Research (RP1633), Armin W. Helz describes a method employing standard mixtures that contain buffer elements (to regulate excitation conditions in the arc), as well as reference elements. A weighed amount of the above material, mixed with the cement, is placed in the crater of a graphite electrode that becomes the lower element of a direct-current arc. The red region of the spectrum is photographed for sodium and potassium and the violet region for lithium. Measurements of the blackening of certain lines of the alkali and the reference elements give the data for the analytical calculations. Analytical curves are required which give the relation between the relative intensities and the concentrations of the elements; they are determined by carrying out exactly the same procedure on series of samples of known compositions.

**LIQUID-JUNCTION POTENTIALS  
AND CALIBRATION OF pH  
METERS**

The advent of the rugged and stable pH meter of the vacuum-tube type has made comparatively easy the measurement of the pH of most solutions with an accuracy within  $\pm 0.1$  pH unit. The manufacture of a large number of medicinals and other products now requires a much greater accuracy in the control of pH, a step which has necessitated the investigation of sources of error formerly considered to be within the uncertainty of the measurements.

In the February issue of the Journal of Research (RP1632), George G. Manov, Nicholas J. DeLollis, and S. F. Acree focus attention on one of the largest remaining sources of error ( $\pm 0.05$  pH unit) in pH measurements, namely, the potential generated at the junction of the standardizing buffer or unknown solution with the saturated potassium chloride solution which forms the electrolyte of the reference electrode. Among the lesser sources of error in pH measurements are the asymmetry potential of the glass electrode, thermal and electrical hysteresis of the calomel electrode, temperature inequalities in the cell system, and unknown salt effects.

In measuring the pH of unknown solutions or in calibrating the scale of a pH meter by the use of two or more buffers, it is the difference between the liquid-junction potentials of the calibrating buffer and of the unknown solution, respectively, in contact with the saturated potassium chloride which must be considered. A method is described by which these differences in liquid junction of two solutions of known pH can be obtained with a precision of  $\pm 0.002$  pH unit, and which is independent of the nature of the reference electrode. The experimental data on hydrochloric acid, phthalate, phosphate, phenolsulfonate, borax, and calcium hydroxide buffers containing sodium or potassium chloride and ranging in pH value from 1.081 to 12.38 were also used to check the consistency of the calibration of the scales of pH meters with the various buffer standards recommended by the Bureau for this purpose. The results show that the maximum error caused by the accidental displacement of these buffer standards from their theoretical position in the pH scale by carbon dioxide and other impurities is less than the sensitivity of the average pH meter (0.01 unit). Data are also given for the calibrations of Type 015 and "low-



alkali error" glass electrodes of commercial manufacture when tested against seven buffer solutions.

#### APPLICATION OF THE ILKOVIČ EQUATION TO QUANTITATIVE POLAROGRAPHY

The polarograph has found numerous applications in both qualitative and quantitative analysis. Most of the published procedures make use of the instrument as an interpolating device for comparison of known and unknown solutions. If the standard and unknown solutions are sufficiently alike and the same dropping electrode is employed for each under identical conditions, the analysis resolves into a comparison of diffusion currents.

A relation between the diffusion current and the constants of the system under investigation was developed by Ilkovič. This relation permits the correlation of data obtained under different experimental conditions, provided they are known to be in the range where this equation is valid. An investigation by Floyd Buckley and J. K. Taylor, reported in the February Journal of Research (RP1631), deals with the conditions of applicability of the Ilkovič equation to polarographic analysis. Results obtained with a capillary of usual characteristics showed that a suppresser is necessary to secure agreement with the equation for any considerable drop-time range and that the need increases with the drop rate of the electrode and the dilution of reducible ion. The near identity of slope at the beginning and end of a polarographic wave was found to be a satisfactory criterion of diffusion control.

The application of the Ilkovič equation to quantitative analysis was shown to be inadvisable unless it has been definitely established that the experimental conditions are well within the range for insuring diffusion control. A logarithmic relation between critical drop-time and suppresser concentration was found.

#### REGION OF USABLE IMAGERY IN AIRPLANE-CAMERA LENSES

When a lens is used for photographing a distant object, there is a considerable range, measured along the lens axis, wherein a tolerably distinct image can be obtained. The magnitude of this range is termed "depth of focus" and may be computed for an ideal lens with the aid of geometric optics supplemented by physical optics. In the Journal of

Research for February (RP 1636), Francis E. Washer gives the results of an investigation initiated to ascertain the extent of agreement between theoretical performance of an ideal lens and the observed performance of actual lenses. In the case of several lenses, the entire region of usable imagery was studied, not only for axial imagery but for extra-axial imagery as well, and for various stop openings. The results are summarized in a group of master curves that completely describe the resolving power characteristics of a given lens for both tangential and radial imagery throughout the entire region of usable imagery.

Careful examination of these curves reveals quantitative information on the variation of resolving power and of depth of focus with stop opening and with angular separation from the axis. The manner in which field curvature affects the imagery in a given plane can be clearly seen. The explanation for the betterment of definition in the image plane of a fixed focus camera that accompanies a reduction of stop opening is at once evident from consideration of these master curves. The master curves showing the results of resolving power measurements on several lenses and additional curves showing the degree of agreement between theoretical and observed performance are given in the report.

#### EMERGENCY COMMERCIAL STANDARD FOR DIAL INDICATORS

The Bureau calls attention to its pamphlet entitled Dial Indicators (For Linear Measurements), Commercial Standard (Emergency) CS(E) 119-45.

The standard was developed on request of the War Production Board, and through the voluntary cooperation of the industry with the Bureau, other Government agencies, distributors and users. It covers minimum essential requirements for precision dial indicators in the American Gage Design type in four groups of sizes, ranging from 1½ in. to 3¾ in. bezel diameter, with four classes of dial markings in English measure, namely 0.000, 0.5, 0.000, 1, 0.000, 5, and 0.001-in., and four classes of dial markings in metric measure, namely, 0.001, 0.002, 0.005, and 0.01 mm.

In addition to standard details for interchangeable mounting and limiting dimensions, the standard sets up requirements for uniform dial markings and dial numberings, repetition of readings, accuracy, packing, and marking to

show manufacturer's name or trade mark. The standard further recommends that the individual manufacturers list in their catalogs and data sheets appropriate references to dial indicators of American Gage Design as recorded in this commercial standard.

The industry expects that the standard which became effective on January 1, 1945, will provide a basis for better understanding between buyers and sellers, as well as a foundation for fair competition and identification of precision dial indicators conforming to the standard. Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., at 5 cents each, with a discount of 25 percent on orders of 100 or more to a single address.

#### COMMERCIAL STANDARD FOR PINE DOORS

Commercial Standard CS120-44 for standard stock ponderosa pine doors, developed voluntarily by manufacturers, distributors, and users, in cooperation with the Bureau, has just been released in printed form. The standard became effective for new production on September 15, 1944.

The pamphlet sets forth definite construction and quality requirements for house, garage, cupboard, combination, summer, storm, and toilet doors and sidelights made of ponderosa pine that has been properly kiln-dried. It includes illustrations of 120 different standard stock designs from which to select doors harmonizing with various architectural styles. By referring to this standard and specifying the design number, the architect or purchaser can obtain doors to meet his need at a considerable saving in cost as compared with custom-made doors of like quality and construction.

In order to keep the commercial standard current, a representative committee of manufacturers, distributors, and users will periodically consider its revision. The pamphlet includes the names of committee members, a brief history of the project, and a list of organizations and individuals who have indicated their acceptance of the standard.

Printed copies of CS120-44 are available from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. The price is 10 cents with a discount of 25 percent in lots of 100 or more.

#### NEW MATHEMATICAL TABLE

The latest mathematical table in the series sponsored by the Bureau gives co-

efficients for differences in terms of the derivatives. This table, which is designated as MT32, was prepared by Herbert E. Salzer, and lists the exact values of the coefficients  $B_{m,s}$  for  $m = 1, 2, \dots, 20$  and  $s = m, m+1, \dots, 20$ , for calculating the  $m^{\text{th}}$  advancing differences by Markoff's formula. It will be useful to anyone who wishes to construct difference tables for functions, the derivatives of which are known. Copies of the table, in the form of reprints from the Journal of Mathematics and Physics, are obtainable from the Information Section, National Bureau of Standards, Washington 25, D. C., at 25 cents each.

#### B. W. SCRIBNER RECEIVES TAPPI MEDAL

The executive committee of the Technical Association of the Pulp and Paper Industry has voted unanimously to present the TAPPI Gold Medal to Bourdon W. Scribner, chief of the Bureau's paper section. This medal is awarded to individuals for outstanding contributions to the technical advancement of the industry; Mr. Scribner is the thirteenth recipient. He has served as chairman of the paper testing committee of TAPPI since 1925, and initiated the systematic development and adoption of testing standards by the Association. He is also a member of the committees on standards and on optical properties. For many years Mr. Scribner has been active in the development of Federal specifications for paper and paper products and is a member of the Committee for Government Printing Office specifications.

In commenting on the award, the "Paper Trade Journal" (December 14, 1944) states that "the aggressive pioneer work of Mr. Scribner and his associates in developing the basic testing methods for paper has done much to bring about the ever increasing quality of paper and paperboard manufactured by the industry and converted into useful paper products. The existence of these established and universally recognized testing methods has been a direct contribution to the war effort in their use in preparing the Army and Navy paper and packaging material specifications since but little time or technical manpower had to be utilized by the Government procurement agencies in developing uniform acceptable test procedures."

The award of the TAPPI Medal will be made at a meeting of the executive committee of the Association in New York on February 19.

**A. S. McALLISTER RETIRES**

Addams S. McAllister, Assistant Director of the Bureau, in charge of commercial standardization, will be retired on February 28. Born at Covington, Virginia, in 1875, Dr. McAllister was graduated with honors from Pennsylvania State College in 1898 and received his master's degree and Ph.D. from Cornell in 1901 and 1905. He entered the electrical engineering profession immediately on leaving college and served for a short time with the Berwind-White Coal Mining Co. and the Westinghouse Electric & Manufacturing Co. A year later he joined the staff of Cornell as an assistant instructor in physics, later becoming acting assistant professor of electrical engineering.

In 1905 Dr. McAllister became associate editor of the *Electrical World* and in 1912, its editor. It was during these years that his ability to write of technical matters clearly and forcefully was demonstrated, and this gift—an all too rare one among professional engineers—stood him in good stead in his subsequent career. Besides writing on his chosen subject, Dr. McAllister is a good speaker—in fact, at one time he delivered many professorial lectures on electrical engineering.

During the first World War he filled numerous important positions, eventually becoming head of the reports branch of the progress section, control bureau of the Ordnance Department. He was a member of the Engineering Council's War Commission of Technical Societies, the Naval Consulting Board, and the Council of National Defense. He is a member of the American Institute of Electrical Engineers.

Dr. McAllister came to the Bureau in 1921 as liaison officer between the Bureau, the Federal Specifications Board (now the Federal Specifications Executive Committee), and the American Engineering Standards Committee, a nongovernmental standardizing organization supported by the leading technical societies and which eventually became the American Standards Association. He was chosen by Dr. Burgess, then Director of the Bureau, to head the newly organized Division of Specifications in 1926, and on the resignation of Ray M. Hudson in 1929, he was appointed Assistant Director in charge of the commercial standardization group, consisting of the Divisions of Simplified Practice, Building and Housing, Specifications, and Trade Standards. Under his direction, these divisions were later reorganized into three—Building and Housing and Spec-

ifications having been consolidated into the present Division of Codes and Specifications.

Dr. McAllister was the prime mover in developing the "willing-to-certify" plan for promoting buying by specifications, which has been several times mentioned in this Bulletin, and which has found wide application, particularly among municipal, county, and State purchasing agencies. Under this plan, manufacturers certify on request that the goods which they propose to furnish comply with certain Federal or other nationally recognized specifications. Lists of "willing-to-certify" manufacturers are compiled by the Bureau and furnished to purchasing agents.

Recognizing that the certification plan is not practicable for over-the-counter buyers, Dr. McAllister has consistently advocated informative labeling, clearly setting forth the nature of the goods offered and preferably the fact that they comply with a definite specification. It is interesting to note that many trade associations and individual manufacturers who in the beginning fought this development, later came round to Dr. McAllister's point of view.

Important contributions to the Bureau's series of publications were the Standards Yearbooks prepared for several years (1927-33) under Dr. McAllister's direction, the various compilations of nationally recognized specifications in given fields, and the National Directory of Commodity Specifications, a revised edition of which is now nearing completion.

## **NEW AND REVISED PUBLICATIONS ISSUED DURING JANUARY 1945**

### **Journal of Research \***

Journal of Research of the National Bureau of Standards, volume 33, number 5, November 1944 (RP1612 to RP1617, inclusive). Price 30 cents. Annual subscription, 12 issues, \$3.50.

Title page, corrections, and contents for volume 32, Journal of Research, January to June 1944 (RP1570 to RP1591, inclusive). Price 5 cents.

### **Research Papers \***

[Reprints from the September and October 1944 Journal of Research]

RP1604. Stress-corrosion tests of bridge-cable wire. Rolla E. Pollard. Price 10 cents.

\* See footnote on p. 17.



RP1608. Liquid-junction potentials, and relative activity coefficients of chloride ions, in concentrated mixed chlorides and nitrates at 25° C. George G. Manov, Nicholas J. DeLollis, and S. F. Acree. Price 10 cents.

RP1609. Ionization constant of boric acid and the pH of certain borax-chloride buffer solutions from 0° to 60° C. George G. Manov, Nicholas J. DeLollis, and S. F. Acree. Price 10 cents.

**Circular<sup>2</sup>**

C24 Supplement. Supplementary list of publications of the National Bureau of Standards, January 1, 1942, to June 30, 1944 (with subject and author indexes). J. L. Mathusa. Price 20 cents.

**Simplified Practice Recommendation<sup>2</sup>**

R61-44. Clay tiles for floors and walls. (Supersedes R61-30). Price 10 cents.

**Commercial Standards<sup>2</sup>**

CS100-44. Porcelain-enameled steel utensils. (Supersedes CS100-42). Price 10 cents.

CS106-44. Boys' pajama sizes (woven fabrics). (Supersedes CS(E)106-43). Price 5 cents.

CS120-44. Standard stock ponderosa pine doors. Price 10 cents.

<sup>2</sup> Send orders for publications under this heading only to the Superintendent of Documents, Government Printing Office, Washington, D. C. Subscription to Technical News Bulletin, 50 cents a year; Journal of Re-

**Technical News Bulletin<sup>2</sup>**

Technical News Bulletin No. 333, January 1945. Price 5 cents. Annual subscription, 50 cents.

**MIMEOGRAPHED MATERIAL**

**Letter Circulars**

[Letter Circulars are prepared to answer specific inquiries addressed to the National Bureau of Standards and are sent only on request to persons having a definite need for the information. The Bureau cannot undertake to supply lists or complete sets of Letter Circulars or send copies automatically as issued.]

LC774. Thermal insulation of dwelling houses. (Supersedes LC759.)

LC775. Electrodeposition: Publications by the staff of the National Bureau of Standards. (Supersedes LC699.)

LC776. List of Commercial Standards. (Supersedes LC763.)

**RECENT ARTICLES BY MEMBERS OF THE BUREAU'S STAFF PUBLISHED IN OUTSIDE JOURNALS<sup>2</sup>**

Technical cohesive strength of metals in terms of the principal stresses. D. J. McAdam, Jr. Metals Technology (29 W. 39th Street, New York 18, N. Y.), 11, No. 8, 5 (December 1944).

search, \$3.50 a year (to addresses in the United States and its possessions and to countries extending the franking privilege); other countries, 70 cents and \$4.50, respectively.

<sup>2</sup> These publications are not obtainable from the Government, unless otherwise stated. Requests should be sent direct to the publishers.



